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Petri Nenonen

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EXAMINER

SUKHAPHADHANA, CHRISTOPHER T

ART UNIT

PAPER NUMBER

2625

DATE MAILED: 03/26/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/742,055

Applicant(s)

NENONEN ET AL.

Examiner

Christopher T. Sukhaphadhana

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 17, 19-26, 29, 34, 35, 40-49 and 58-60 is/are rejected.
- 7) ☒ Claim(s) 5-16, 18, 27, 28, 30-33, 36-39 and 50-57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The Preliminary Amendment filed 22 December 2000 has been entered in full.

Drawings

2. Figures 1-9 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Title

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Specification

4. The abstract of the disclosure is objected to because the first sentence does not seem proper. Consider adding "where" between "device" and "an inverse" on the first line of the abstract. Correction is required. See MPEP § 608.01(b).
5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

6. The following quotation of 37 CFR 1.75(d)(1) forms the basis of objection:

(d)(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent bases in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. (See 1.58(a))

7. **Claims 13, 17, 25, 26, 40, 44, 52** is objected to under 37 CFR 1.75(d)(1) as failing to conform to the invention as set forth in the remainder of the specification.

8. In regards to **claim 13, 17, 25, 26, 40, 44, 52** the expression “inverse mapping function” is inconsistent with the rest of the specification. Consider substituting with -- inverse histogram-based mapping function--. Note in specification, page 16, line 15, “the inverse histogram-based pixel mapping function is not an inverse function in a strict mathematical sense”.

9. **Claim 17** is objected to because of the following informalities: Claim 17 fails to end in a period. Appropriate correction is required.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. **Claim 34** is rejected under 35 U.S.C. 112, first paragraph, because the specification does not reasonably provide enablement for an image processing means for enhancing a digital image comprising a set of image pixels, the processing means comprising means for applying an inverse histogram-based mapping function to the image pixels. The specification does not

enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

The MPEP, at paragraph 2164.08(a), states that “[a] single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph” because a single means claim covers “every conceivable means for achieving the stated purpose” while “the specification disclosed at most only those means known to the inventor.”

While the claim verbatim recites two means, the claim covers the breadth of a single means claim (i.e. every conceivable means for achieving the stated purpose while the specification discloses at most only those means known to the inventor) because one means fails to add limitations to the claim. In other words, an invention reading on the second means inherently also reads on the first means. Specifically, every conceivable means for applying an inverse histogram-based mapping function to image pixels (including those means not known to the inventor) is also an image processing means for enhancing a digital image comprising a set of image pixels, the processing means comprising itself. Thus, the claim as recited covers the breadth of a single means claim, where the single means is the means for applying an inverse histogram-based mapping function to image pixels.

Note that **claim 45** is directed to image processing means of claim 34 embodied in a portable radio communication device. Claim 45 is *not* rejected under the above reasoning because embodiment in a portable radio communication device brings in limitations such that the single means is in combination with those limitations.

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12. **Claim 35** is rejected under 35 U.S.C. 112, first paragraph, because the specification does not reasonably provide enablement for single means for applying an inverse histogram-based mapping function to the image pixels. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

The MPEP, at paragraph 2164.08(a), states that “[a] single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph” because a single means claim covers “every conceivable means for achieving the stated purpose” while “the specification disclosed at most only those means known to the inventor.”

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. **Claims 1-4, 17, 19-26, 29, 34-35, 40-44, 46, and 58-60** are rejected under 35

U.S.C. 102(b) as being anticipated by Cok (U.S. Patent 5,793,886, cited in IDS filed 17 April 2001, “Cok”).

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15. In regards to **claim 1**, Cok discloses in col 5, lines 17-29, “LUT”, a method for image enhancement of a digital image comprising a set of image pixels, the method comprising applying an inverse histogram-based mapping function to the image pixels.

Note in col 5, line 24, the LUT is used to convert actual code values of the source image F to corrected code values for the adjust frame F'. In col 5, line 20, LUT is derived from interpolated inverse cumulative histogram CHFI.

16. In regards to **claim 2**, Cok discloses in col 5, lines 17-29, “LUT”, a method for image enhancement of a digital image comprising image pixels, the method comprising applying an inverse histogram-based mapping function to a set of said image pixels.

17. In regards to **claim 3**, Cok further discloses in col 5, line 24, “source image F”, the set of said image pixels comprises all image pixels of the digital image.

18. In regards to **claim 4**, Cok further discloses in col 5, line 24, the set of said image pixels comprises a part of all image pixels of the digital image.

19. In regards to **claim 17**, Cok further discloses the formation of the inverse histogram-based mapping function comprising: constructing a histogram of pixel values from at least part of said image pixel values (Fig 3, HF(i)), forming a cumulative histogram from said histogram (Fig 3, CHF(i)), deriving a mapping function from the cumulative histogram (col 5, line 20, CHF(i)), forming an inverse mapping function from said mapping function (Fig 3, CHFI(x)).

20. In regards to **claim 19**, Cok further discloses in col 3, constructing a histogram of pixel values comprises the steps of: defining a set of pixel value ranges; for each pixel value range, counting the number of image pixels from said at least part of said image pixels that have values within that range.

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21. In regards to **claim 20**, Cok further discloses in col 3, the step of forming a cumulative histogram comprises the step of: for each pixel value range, adding to the number of image pixels within that range the number of image pixels in all pixel value ranges comprising smaller pixel values than that range.

22. In regards to **claim 21**, Cok further discloses in col 3, the mapping function being derived from said cumulative histogram using the number of image pixels within each pixel value range of said cumulative histogram.

23. In regards to **claim 22**, Cok further discloses in col 3, the mapping function being derived from said cumulative histogram by interpolating between pixel value ranges of said cumulative histogram.

24. In regards to **claim 23**, Cok further discloses in col 3, the histogram of pixel values is processed to form a modified histogram before said step of developing a cumulative histogram.

25. In regards to **claim 24**, Cok further discloses in col 3, the cumulative histogram is processed to form a modified cumulative histogram before said step of deriving a mapping function.

26. In regards to **claim 25**, Cok further discloses in col 3, the mapping function being processed to form a modified mapping function before said step of forming an inverse histogram-based mapping function.

27. In regards to **claim 26**, Cok further discloses in col 5, the inverse histogram-based mapping function is modified to form a modified inverse histogram-based mapping function and said modified inverse histogram-based mapping function is applied to the set of said image pixels.

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28. In regards to **claim 29**, Cok further discloses in col 2, the inverse histogram-based mapping function is applied to the set of said image pixels prior to or after applying another image processing function.

29. In regards to **claim 34 and 35**, all the elements set forth in this claim have been addressed in the argument of claim 1 and 2, respectively.

30. In regards to **claim 40 and 41-44**, all the additional elements set forth in this claim have been addressed in the argument of claim 17 and 23-26, respectively.

31. In regards to **claim 46**, all the elements set forth in this claim have been addressed in the argument of claim 1.

32. In regards to claims **58, 59, and 60**, all the additional elements set forth in these claims have been addressed in the arguments of claims 24, 25, and 25, respectively.

33. **Claim 49** is rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's admitted prior art (specification, paragraph bridging pages 9-10, and Fig 9, "Admitted Art").

34. In regards to **claim 49**, Admitted Art discloses in Fig 9, A-selection, a method for image enhancement of a digital image comprising image pixels, the method comprising applying a histogram-based pixel mapping function to a set of said image pixels prior to applying an image processing function (Fig 9, edge enhancement unit) that has the effect of increasing pixel value variation.

Claim Rejections - 35 USC § 103

35. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

36. **Claim 45** is rejected under 35 U.S.C. 103(a) as being unpatentable over NEC Press Release (NEC Press Release, 22 September 1999, newly cited “NEC”) in combination with Cok (U.S. Patent 5,793,886, cited above, “Cok”).

In regards to **claim 45**, NEC discloses a portable radio communication device (Mobile Videophone).

NEC does not expressly disclose the remaining limitations.

However, NEC does disclose the phone realizing large capacity video streaming (third paragraph).

Cok teaches in col 5, lines 17-29, “LUT”, an image processing means for enhancing a digital image comprising a set of image pixels, the processing means comprising means for applying an inverse histogram mapping function to the image pixels.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Cok’s image processing means into NEC’s portable radio communication device because it would remove unwanted image flicker from a sequence of images, particularly motion image sequences, in which the image sequence has an intended image variation that is not to be removed (Cok, col 1, line 11).

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37. **Claims 47-49** are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (specification, paragraph bridging pages 6-7, and Fig 5, "Admitted Art") in combination with Gonzalez et al (Digital Image Processing, 1993, "Gonzalez").

In regards to **claim 47**, Admitted Art teaches in Fig 5, a method for image enhancement of a digital image comprising a set of image pixels, the method comprising applying, in a branch of an edge enhancement unit that is parallel to an original image branch, a pixel mapping function to said set of image pixels prior to applying a highpass filter in said branch.

Admitted Art does not expressly disclose the pixel mapping function being a histogram-based pixel mapping function.

Gonzalez teaches a histogram-based pixel mapping function (Histogram equalization).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Gonzalez's histogram-based pixel mapping function as Admitted Art's pixel mapping function because it increases the dynamic range of gray levels and produces an increase in image contrast (Gonzalez, page 179).

38. In regards to **claims 48 and 49**, all the elements set forth in these claims have been addressed in the argument of claim 47.

Allowable Subject Matter

39. **Claims 5-12, 14-16, 18, 27-28, 30-33, 36-39, 50-51, 53-57** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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40. **Claim 13 and 52** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome the claim objection in independent form including all of the limitations of the base claim and any intervening claims.


Conclusion

41. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher T. Sukhaphadhana whose telephone number is 703-306-4148. The examiner can normally be reached on 9a-4p M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M. Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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